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metallic sections of the fill pipe separated thereby must be joined by a conductor for protection against generation of a static charge when filling with fuel.

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§ 119.450 Vent pipes for fuel tanks.

(a) Each unpressurized fuel tank must be fitted with a pipe connected to the highest point of the tank.

(b) The minimum net cross sectional area of the vent pipe for diesel fuel tanks must be as follows:

(1) Not less than the cross sectional area of 16 millimeters (0.625 inches) outer diameter (O.D.) tubing (0.9 millimeter (0.035 inch) wall thickness, 20 gauge), if the fill pipe terminates at the top of the tank;

(2) Not less than the cross sectional area of 19 millimeters (0.75 inches) O.D. tubing (9.8 millimeter (0.035) inch) wall thickness, 20 gauge), if the fill pipe extends into the tank; and

(3) Not less than the cross sectional area of the fill pipe if the tank is filled under pressure.

(c) The discharge ends of fuel tank vent pipes must terminate on the hull exterior as high above the waterline as practicable and remote from any hull openings, or they must terminate in U-bends as high above the weather deck as practicable and as far as practicable from opening into any enclosed spaces. Vent pipes terminating on the hull exterior must be installed or equipped to prevent the accidental contamination of the fuel by water under normal operating conditions.

(d) The discharge ends of fuel tank vent pipes must be fitted with removable flame screens or flame arresters. The flame screens must consist of a single screen of corrosion resistant wire of at least 30×30 mesh. The flame screens or flame arresters must be of such size and design as to prevent reduction in the net cross sectional area of the vent pipe and permit cleaning or renewal of the flame screens or arrester elements.

(e) Where a flexible vent pipe section is necessary, suitable flexible tubing or hose having high resistance to salt water, petroleum oils, heat and vibration, may be used. Such hose must overlap metallic pipe ends at least 1.5 times the pipe diameter and must be secured at each end by clamps. The flexible section must be accessible and as near the upper end of the vent pipe as practicable.

(f) Fuel tank vent pipes shall be installed to gradient upward to prevent fuel from being trapped in the line.

§ 119.455 Fuel piping.

(a) *Materials and workmanship.* The materials and construction of fuel lines, including pipe, tube, and hose, must comply with the requirements of this paragraph.

(1) Fuel lines must be annealed tubing of copper, nickel-copper, or copper-nickel having a minimum wall thickness of 0.9 millimeters (0.35 inches) except that:

(i) Diesel fuel piping of other materials, such as seamless steel pipe or tubing, which provide equivalent safety may be used;

(ii) Diesel fuel piping of aluminum is acceptable on aluminum hull vessels provided it is at least Schedule 80; and

(iii) When used, flexible hose must meet the requirements of § 56.60–25 in subchapter F of this chapter.

(2) Tubing connections and fittings must be of nonferrous drawn or forged metal of the flared type except that flareless fittings of the nonbite type may be used when the tubing system is of nickel-copper or copper-nickel. When making tube connections, the tubing must be cut square and flared by suitable tools. Tube ends must be annealed before flaring.

(3) Cocks are prohibited except for the solid bottom type with tapered plugs and union bonnets.

(b) *Installation.* The installation of fuel lines, including pipe, tube, and hose, must comply with the requirements of this paragraph.

(1) Diesel fuel lines may be connected to the fuel tank at or near the bottom of the tank.

(2) Fuel lines must be accessible, protected from mechanical injury, and effectively secured against excessive movement and vibration by the use of soft nonferrous metal straps that have no sharp edges and are insulated to protect against corrosion. Where passing through bulkheads, fuel lines must